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Comparative studies of the weakly nonlinear evolution of hydrodynamic interface instabilities in 2D and 3D, M.Berning,[1] A. Rubenchik,[2] S.G. Glendinning,[3] and B.A. Remington,[3] 1) Düsseldorf University, 2) University of California-Davis, 3) LLNL. Supernova explosions are virtual cauldrons of hydrodynamic instability activity. Due to the exceedingly strong shock triggering the explosion, the interface instabilities are insensitive to the initial pressure distribution and gravity. As a result. the instability development can be modeled in the laboratory, in laser driven experiments. In the present paper we will compare the growth of pre-imposed 3D and 2D interface perturbations for experiments using the Nova laser to model supernovae interface evolution. We developed a weakly nonlinear theory of interface evolution extended to third order perturbation theory. Our nonlinear theory takes into account the temporal variation of the interface acceleration, final layer thickness, and material ablation. Acceleration of the interface is calculated with a 1D simulation using the radiative hydrodynamics code HYADES. We evaluate the growth of the fundamental mode and higher harmonics into bubbles and spikes during the early nonlinear stages of perturbation evolution. *Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48